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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/646,572	08/23/2003	James J. deBlanc	200206163-1	9534

22879 7590 08/10/2007  
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INTELLECTUAL PROPERTY ADMINISTRATION  
FORT COLLINS, CO 80527-2400

EXAMINER
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RAHLL, JERRY T

ART UNIT	PAPER NUMBER
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2874

MAIL DATE	DELIVERY MODE
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08/10/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

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<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/646,572	DEBLANC ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Jerry T. Rahl	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 23 May 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-23 and 50 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23, 50 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

2. A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. **Claims 1 and 50 are rejected under 35 U.S.C. 102(b) as being anticipated by No. 5,432,873 to Hosoya et al.**

4. Regarding Claim 1, Hosoya et al. describes a method of forming an optical communication path including forming a channel (8,11) in a planar layer in a first (7) and a second (10) substrates of a multilayered printed circuit board (shown in Figure 1), forming a portion of an optical path in the channel of the first and second substrates where the substrates are stacked together in the multi-layered printed circuit board, and coupling with a switch (9 with 13) the channel in the first substrate with the channel in the second substrate (see Figures 1-2 and Columns 6-7).

5. Regarding Claim 50, Hosoya et al. describes switching the switch between an opaque state that prevents the passage of an optical signal and a transparent state that permits the passage of an optical signal (see Column 7 Lines 1-25).

### *Claim Rejections - 35 USC § 103*

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented

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and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**8. Claims 2, 4-5 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosoya et al. as applied to claim 1 above, and further in view of US Patent Application Publication No. 2003/0118310 to Steinberg et al.**

9. Hosoya et al. does not describe the formation of the channels including the methods of the present claims. Steinberg et al. describes an alternate method of forming optical waveguides. At the time of in the invention, it would have been obvious to one of ordinary skill in the art to use the method of forming waveguides described by Steinberg et al. in forming the device of Hosoya et al. the motivation for doing so would have been to provide efficient optical coupling (see paragraph 0003 of Steinberg et al.)

10. Regarding Claim 2, Steinberg et al. describes creating the channel using a chemical process to remove planar layer material (see Paragraph 0025).

11. Regarding Claim 4, Steinberg et al. describes lithography defining a location of the optical path on the planar layer and etching the planar layer along the defined location of the optical path to create the channel (see Paragraph 0025).

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12. Regarding Claim 5, Steinberg et al. describes filling the channel with an optical core medium (see Paragraph 0027).

13. Regarding Claim 9, Steinberg et al. describes depositing a cladding portion (22) within the channel and depositing a core medium (24) in the channel.

14. Regarding Claim 10, Steinberg et al. describes the cladding having a refractive index less than the core refractive index (see Figures 16-18(e)).

15. Regarding Claim 11, while Steinberg et al. does not specifically describe the cladding portion as reflective along a side adjacent the optical core medium, the cladding described by Steinberg et al. would inherently be reflective to allow for light-guiding along the core.

**16. Claims 2-5 and 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosoya et al. as applied to claim 1 above, and further in view of US Patent No. 6,624,077 to White.**

17. Hosoya et al. does not describe the formation of the channels including the methods of the present claims. White describes an alternate method of forming optical waveguides. At the time of in the invention, it would have been obvious to one of ordinary skill in the art to use the method of forming waveguides described by White in forming the device of Hosoya et al. The motivation for doing so would have been to provide efficient optical coupling (see Column 2 of White)

18. Regarding Claim 2, White describes creating the channel using a chemical process to remove planar layer material (see Figures 4A-4D).

19. Regarding Claims 3, Hosoya et al. and White do not specifically describe molding the planar layers with the channels. However, White does describe the planar layer formed from

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plastic (see Column 6 Line 65). It is well-known in the art that plastic may be molded into a desired shape. At the time of invention, it would have been obvious to one of ordinary skill in the art to mold the layers described by White with channels. The motivation for doing so would have been to eliminate the need for additional manufacturing steps to create the channels.

20. Regarding Claim 4, White describes lithography defining a location of the optical path on the planar layer and etching the planar layer along the defined location of the optical path to create the channel (see Column 7 Lines 44-50).

21. Regarding Claim 5, White describes filling the channel with an optical core medium (see Figure 4E and Column 8 Line 65-Column 9 Line 15).

22. Regarding Claim 12, White describes the planar layer as a semiconductor (see Column 4 Line 50).

23. Regarding Claim 13, White describes the walls of the channel having a lower refractive index than the core medium (see Column 5 Lines 40-50).

24. Regarding Claim 14, White describes the optical path as noncylindrical (see Figure 1 and Column 2).

25. Regarding Claim 15, Hosoya et al. and White do not specifically describe forming an electrical trace on the substrate. However, it is well-known in the art to create electrical traces on semiconductor substrates. Therefore, at the time of invention, it would have been obvious to one of ordinary skill in the art to form an electrical trace on the semiconductor planar layer described by White. The motivation for doing so would have been to allow for connection to optoelectronic devices that may be optically connected to the optical communication path.

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**26. Claims 2, 6-9 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosoya et al. as applied to claim 1 above, and further in view of US Patent Application Publication No.2001/0026670 to Takizawa et al.**

27. Hosoya et al. does not describe the formation of the channels including the methods of the present claims. Takizawa et al. describes an alternate method of forming optical waveguides. At the time of in the invention, it would have been obvious to one of ordinary skill in the art to use the method of forming waveguides described by Takizawa et al. in forming the device of Hosoya et al. The motivation for doing so would have been to provide efficient optical coupling (see Paragraphs 0005-0006 of Takizawa et al.).

28. Regarding Claim 2, Takizawa et al. describes creating the channel using a chemical process to remove planar layer material (see Paragraph 0059).

29. Regarding Claim 6, Takizawa et al. describes depositing a first cladding portion (3) in the channel, depositing an optical core medium (4) in the channel, and depositing a second cladding layer (5) over the optical core medium (see Figures 5-8 and Paragraphs 0058-0065).

30. Regarding Claims 7-8, Takizawa et al. does not specifically describe the cladding portions as having an index of refraction less than the index of refraction of the core, or as being optically reflective along a side adjacent to the optical core medium. However, claddings inherently possess such properties to guide light through an optical core.

31. Regarding Claim 9, Takizawa et al. describes depositing a cladding portion (3) in the channel and depositing an optical core medium (4) in the channel (see Figures 5-8 and Paragraphs 0058-0065).

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32. Regarding Claim 14, Takizawa et al. describes the optical path as substantially noncylindrical (see Paragraph 0056).

**33. Claims 16, 18-19 and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over White in view of US Patent No. 6,693,736 to Yoshimura et al.**

34. Regarding Claim 16, White describes a method of forming an optical communication path including providing a first substrate (206) with a planar layer having a channel face (213) defining a first channel (212), providing a second substrate with a planar layer (205) having a complementary channel face (214) defining a second channel (210), and placing the planar layers such that the first and second channels oppose each other to form a composite channel (210) defining the optical path in a multilayer printed circuit board (see Figure 2A). White does not describe providing vias through the planar layers to connect the channel with different optical pathways extending through different vertically stacked layers of the multi-layered printed circuit board.. Yoshimura et al. describes a method of forming an optical communication path including providing channels (5, 11) that form an optical path and providing vias (9) through the layers forming the channel to connect different optical pathways and extending through different vertically stacked layers of the multi-layered printed circuit board (see Figures 1-2). At the time of in the invention, it would have been obvious to one of ordinary skill in the art to use the via structures of Yoshimura et al. with the pathway structure of White. The motivation for doing so would have been to allow for dense optical packaging.

35. Regarding Claim 18, White describes depositing the core medium within the first and second channels (see Figure 4E and Column 8 Line 65-Column 9 Line 15).



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36. Regarding Claim 19, White describes filling the composite channel with an optical core medium (see Column 6 Lines 45-50, where the core medium is air).

37. Regarding Claim 21, White describes the first and second channels having semi-circular cross-sections (see Figures 2A, 3A and 3B).

38. Regarding Claim 22, White describes creating the channels using a chemical process applied to a planar layer (see Figures 4A-4D).

39. Regarding Claim 23, White and Yoshimura et al. do not specifically describe molding the planar layers with the channels. However, White does describe the planar layer formed from plastic (see Column 6 Line 65). It is well-known in the art that plastic may be molded into a desired shape. At the time of invention, it would have been obvious to one of ordinary skill in the art to mold the layers described by White with channels. The motivation for doing so would have been to eliminate the need for additional manufacturing steps to create the channels.

**40. Claims 17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over White and Yoshimura et al. as applied to claim 16 above, and further in view of Steinberg et al.**

41. Regarding Claim 17, White and Yoshimura et al. do not specifically describe applying a reflective coating to the first and second planar layers. Steinberg describes a method of forming an optical communication path including applying a reflective coating (22) to a planar layer. At the time of invention, it would have been obvious to one of ordinary skill in the art to apply the reflective coating of Steinberg et al. to the planar layers of White et al. The motivation for doing so would have been to reduce signal leakage along the optical communication path.

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42. Regarding Claim 20, White and Yoshimura et al. do not specifically describe applying a reflective coating to the first and second channels. Steinberg describes a method of forming an optical communication path including applying a reflective coating (22) to a channel. At the time of invention, it would have been obvious to one of ordinary skill in the art to apply the reflective coating of Steinberg et al. to the channels of White et al. The motivation for doing so would have been to reduce signal leakage along the optical communication path.

***Response to Arguments***

43. Applicant's arguments filed May 23, 2007 have been fully considered but they are not persuasive.

44. Applicant argues that Hosoya does not describe optical waveguides formed within substrates of a multi-layered PCB. The examiner notes that "substrate" is a very broad term referring to any layer underneath another layer. In the case of Hosoya, layers 7 and 10 constitute substrates (while layer 10 is shown on top in the Figure of Hosoya, it may be considered that an air layer is above layer 10, or that the overall device may be considered upside-down where layer 10 would be under layer 9). Further, the device of Hosoya comprises a multi-layered printed circuit board. It is multi-layered because to comprises layers 6, 7, 9, and 10. It is a printed circuit board because the optical circuits defined by waveguides 8 and 11 are printed thereon.

45. Applicant also argues that White does not describe optical waveguides formed within substrates. The examiner notes that "substrate" is a very broad term referring to any layer underneath another layer. In the case of White, layers 206 and 207 constitute substrates (see Figure 2A).

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46. Applicant also argues that neither White nor Yoshimura describe vias connecting a channel with different optical pathways extending through different vertical stacked layers of a multi-layered printed circuit board. Yoshimura shows vias (9) connecting a channel (4) with different optical pathways (11) extending through vertically different stacked layers (10) of a multi-layered printed circuit board.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

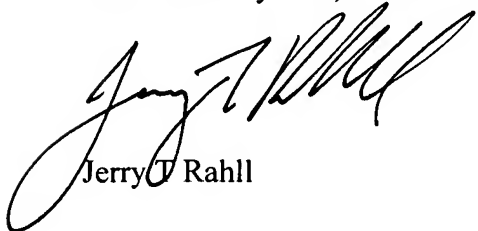
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jerry T. Rahll whose telephone number is (571) 272-2356. The examiner can normally be reached on M-F (9:00-5:00).


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Jerry T. Rahll



MICHELLE CONNELLY-CUSHMAN  
PRIMARY EXAMINER  
8/6/07